

# The landscape approach to conservation: community involvement, the only practical solution

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## ABSTRACT

The aim of those developing and subsequently managing land in rural areas should be to ensure that the native flora and fauna are preserved, along with the agricultural productivity of the land. Unfortunately, there are few places where this has been achieved; land degradation (as indicated by increasing soil salinization, wind and water erosion, pollution of water supplies and the loss of soil productivity due to depletion of nutrients) and species loss has usually followed development.

If we are to retain nature conservation values and preserve agricultural productivity, the processes leading to soil salinization, wind erosion, water erosion and fouling of water supplies, etc. must be reversed. This will involve revegetating very large areas, i.e., whole landscapes. At present we know much about rehabilitating small areas such as mine sites and other derelict land, but we know little about restoring entire water catchments, or land systems. We need to understand how to conserve existing remnant areas to prevent further loss of species and to find ways to revegetate extensive areas of cleared and degraded landscapes.

Having established methods to carry out the restoration process, they will need to be put into practice; this is beyond the resources of the agencies responsible for conservation and land management, which should act only as consultants to local communities who will need to carry out the work.

Communication and education are vital in the process of developing community involvement in research, monitoring and restoration of their land. It is only by involving people during the research and monitoring that they will become aware of the detrimental changes to their environment, particularly the natural resources. If people do not become aware of these changes as they occur, then it will not be possible for them to be motivated to restore the landscape.

## INTRODUCTION

Recher (1990) in his keynote address to the Australian Chapter of the International Union for the Conservation of Nature and Natural Resources Threatened Species Conference raised a number of extremely important issues. Among these were the following:

1. We should concentrate on habitat conservation and ecosystem management instead of directing scarce conservation resources into single species studies or reserving small parcels of land as national parks or nature reserves.
2. We should cease agricultural practices that are mining our soils and individual land use practices need to conform to the need for sustainable production.
3. Without immediate and direct action, we will see in Australia a precipitous extinction of much of our biota.
4. There is too little conservation attention being paid to our semi-arid and arid zones where our most important resource management issues are concentrated.
5. Wildlife management and conservation must be extended to all land regardless of tenure.

Recher also raised the issue of effective population size pointing out that Australia has an effective population of about 1.5 billion in terms of impact on the world's environment, a point argued strongly by Ehrlich and Ehrlich (1990) in their latest book "The Population Explosion". In the light of the increased interest in the issue of immigration, the matter of Australia's population size is a subject which needs to be debated fully as a matter of some urgency. Many of our current conservation problems will become insoluble if we continue to let our population increase. We must establish soon what is the carrying capacity of our land, and hold our population within that limit.

There are many who will accuse Recher of being alarmist and say that the situation is nowhere near as bad as he states. I agree with all that Recher (1990) says and I would like to expand on several of the points raised by him.

In 1980 the International Union for the Conservation of Nature and Natural Resources put forward its World Conservation Strategy which set out three main objectives for nature conservation. These were to maintain essential ecological processes and life-support systems, to preserve genetic diversity, and to ensure the sustainable utilization of species and ecosystems.

Agricultural systems were singled out for immediate attention because humans are so dependent on their productivity. Throughout history, agricultural enterprises have flourished, then declined and failed as degradation of the land ensued (Ehrlich and Ehrlich 1987). In spite of our increased awareness of the consequences of land degradation, over-exploitation of agricultural systems continues.

Ideally, the objective of developing and managing land should be to ensure that agricultural productivity is integrated into the landscape so that the native flora and fauna are conserved for future generations. There are few, if any, areas in the world where this has been achieved. In countries such as Australia where clearing for agriculture has been carried out within the last 150 years or is still proceeding, the conservation approach to farming, as suggested in the World Conservation Strategy, has not been followed. For example, 93% of the 14 million ha wheatbelt of southwestern Australia has been stripped of its native vegetation for the production of wheat and sheep. Over half of this area was cleared after 1945 (Saunders 1989a), and as late as the early 1970s the Government of Western Australia was releasing 405 000 ha a year with the conditions that the land must be both fenced and cleared. No guidance was given as to how much native vegetation to leave, nor where in the landscape it was to be left. This was despite the fact that the link between overclearing and soil salinization had been established in the 1920s. The result is a rapidly degrading landscape with widespread death of the remaining trees, heavy loss of topsoil, and increasing levels of soil salinity. This is a direct result of overclearing and the subsequent changes in hydrology. At present about 3% of agricultural land in southwestern Australia is unproductive because of soil salinization and the area affected is increasing by 25 000 ha per year. Nearly 20% of this agricultural land could be rendered useless for cereal cropping within the next 30 years (Henschke 1980; Nulsen 1988; Saunders and Hobbs 1989) because of this one factor.

Loss of nature conservation values has generally accompanied agricultural development as most native species are sequestered in remnant patches of native vegetation that are too few, too small, and too isolated to maintain viable populations of the species present before clearing (see Saunders *et al.* 1987). For example, prior to European settlement in 1829 there were 46 species of indigenous mammals in the wheatbelt of Western Australia. Of these, 13 species have disappeared from the wheatbelt and nine (of these 13) from the entire Australian mainland. Only 22 species remain common and some of these have very limited ranges (Kitchener *et al.* 1980; Saunders 1985). Two of 148 species of land-birds recorded in the wheatbelt over the last 90 years

have disappeared from the region; one of these, the thick-billed grass wren *Amytornis textilis*, is nationally endangered (Blakers *et al.* 1984). Over half of the 148 species have been adversely affected by development for agriculture and have undergone contractions in range and/or abundance (Saunders 1989a) and many are likely to disappear from the wheatbelt over the next 50 years.

### ***The Role of Ecologists and other Conservation Biologists in Conservation of Landscapes***

The problem is clear: if we are to retain nature conservation values and maintain agricultural productivity, the processes leading to the loss of productive topsoil, the pollution of soils and water, and further loss of species must be reversed and, in most cases, extensive restoration of land systems must take place. This is simple to say but will be difficult to achieve in practice.

Once land has been stripped of its native vegetation, had its soil structure altered, and its regional ecosystems disrupted, restoration of balanced, functioning ecosystems may be impossible. Given the complexity of most ecosystems it will never be possible to restore fully the most disturbed areas (see Bradshaw and Chadwick 1980; Bradshaw 1983; Bradshaw *et al.* 1986; Majer 1989 for references).

In many countries rehabilitation is required as a condition of obtaining the licence to extract resources from an area. In Australia, this has not been the tradition in agricultural land. With current knowledge, it is obvious that this policy must be changed. We know that agriculture is not sustainable in the long term, however, we know almost nothing about ecosystem restoration on a regional scale. Research into ecosystem restoration should aim to demonstrate that self-sustaining agricultural systems can be integrated with conservation of native biota, but what form should the restored landscape take? Is it to be a landscape the sole aim of which is to support self-sustaining forms of agriculture or is it to be a landscape that meets the three objectives of the World Conservation Strategy? There should be no further argument with the view that we should aim for the latter and so we need to be able to model landscapes such that we can predict, for example, which areas need to be revegetated to control the water table and so mitigate the effects of soil salinization, wind and water erosion. Consideration should be given to placement of revegetated areas such that they complement existing remnant areas and bolster that area available for conservation (see Harris 1984; Harris and Gallagher 1989).

It is necessary to stress that there will be no quick technological "fix" to aid these restoration processes. Older developed areas may not have retained remnants

of the original vegetation and so synthetic landscapes (see Bridgewater 1990) may be necessary for these regions. Methods for the restoration of landscapes will differ depending on the objectives and the length of time the landscape has been modified by humans. Techniques developed for rehabilitating mine sites or other derelict land may be modified for use over broad areas where the landscape is a highly modified or synthetic one. In areas where there are still remnants of the original flora, the objectives should include producing vegetation associations resembling the original vegetation. Research should aim at fostering the controlled invasion of remnant vegetation over the landscape directing it into areas where models predict it will have maximum impact in affecting soil conservation and nature conservation.

Where restoration involves fostering natural vegetation we need to know how the biota has reacted to fragmentation of the landscape, how it responds to natural factors such as climatic change, as well as how it responds to human-induced effects such as changing patterns of burning, grazing or harvesting. In order to retain options for the continued use of remnant vegetation and its associated fauna, we need to understand how to conserve existing remnants to prevent further loss of species. In some cases, and as part of the models needed for restoration, we need to develop methods to determine the plant and animal communities which were present in parts of the landscape. This will involve detective work using the methods of historical ecology, such as examining museum collections to establish distributions of indicator species and research into the ecology of those species. Using these data it may be possible to restore these communities to those areas in the landscape where they formerly occurred (see Main 1990).

Until recently, the emphasis of many nature conservation agencies has been the acquisition and management of large national parks and nature reserves. However, in many parts of Australia, it is not possible to establish systems of large, interconnected reserves and conservation objectives must be achieved by concentrating on small, isolated fragments of communities and ecosystems. To achieve the goal of conservation, nature conservation agencies must recognize the values of remnant vegetation and devise appropriate management strategies that are based on a proper understanding of the biota and the processes that sustain it (Saunders *et al.* 1987; Saunders *et al.* 1990).

### *The Role of the Human Community*

It is one thing to establish the knowledge and methods by which landscape restoration **could** take place. It is a different thing to convince people that restoration **should** take place. It is the role of ecologists and other conservation

biologists to demonstrate to the public-at-large that it is within their capacity to ensure that landscape restoration does take place. The increasing urbanization of the world's population is one factor which will work against this education process. Since 1925 when only one-fifth of the population lived in urban areas, the population has doubled and now two-fifths of the population live in urban areas (Ehrlich and Ehrlich 1981). Most of the residents of cities seldom enter undisturbed natural environments and have a limited view of nature (Saunders and Burbidge 1988). To them, land management problems may be ignored or solved by technology, spraying, cutting, or simply removing and replacing undesirable elements.

It is not so simple in rural Australia where the area to be restored is large compared to the population which is small. Departments of Agriculture, Conservation and other agencies involved with land management usually do not have the resources to undertake restoration or management processes themselves, nor often, the resources to achieve their own objectives. In the wheat-belt of Western Australia, for example, the Department of Conservation and Land Management has one member of staff (including clerical staff) for every 40 of the 639 reserves it manages (Wallace and Moore 1987). This is inadequate for the number and area of the remnants involved, let alone attempting to manage the thousands of privately owned remnants that comprise the bulk of the remnant vegetation in the wheatbelt.

In future, land management agencies will need to act as consultants to provide advice on methods for restoring landscapes with the work being carried out by members of the local community with support from the rest of the community and their politicians.

To achieve community involvement it is necessary to educate people about the changes that are taking place in the landscape, the implications of those changes and of the role the community can play in managing the changes. This will involve a shift in attitude and work practices of most ecologist, conservation biologists, agricultural scientists and landscape architects from carrying out research in isolation, to involving the members of the community in carrying out the research and applying the results.

Much of the research aimed at documenting changes and monitoring results of restoration can be performed by members of the community who should assist in data collection. This has been done in various ways and the North American breeding bird survey (Robbins *et al.* 1986), the Australian Atlas of Birds (Blakers *et al.* 1984) and the Banksia Atlas (Taylor and Hopper 1988) are examples of this approach. The CSIRO Division of Wildlife and Ecology has been using EARTHWATCH and

its Research Corps to provide funds and volunteers for a major study of the movements of birds and kangaroos within and between remnants of native vegetation over a 625 km<sup>2</sup> area in the Kellerberrin district of Western Australia (Saunders 1989b). This study is very labour intensive, expensive and will need to be conducted over a long time to produce results useful for the management of the biota. CSIRO has also involved other volunteers in its regular field work and has obtained, throughout the wheatbelt, the enthusiastic support of several hundred volunteers who take part in the checklist of birds of the wheatbelt of Western Australia and keep notes weekly of all the species they observe in their vicinity. The first year of these data have been used to examine the changes in species distribution and abundance since clearing for agriculture began (Saunders 1989a). There are other examples of this approach (Earthwatch 1990) but there must be many more in future.

Involving people in research such as the monitoring of their environment and their natural resources makes them aware of changes as they occur and often produces enthusiastic crusaders who will help motivate others to undertake restoration; an essential flow-on effect.

### ***The Challenge for Ecologists and other Conservation Biologists***

Ecologists and other conservation biologists must motivate the community to start the restoration process. Given the area involved, it will be a community responsibility to carry out the work and, in many cases, any management of conservation areas in their landscapes.

No ecologist or conservation biologist should miss any opportunity to educate people about the issues involved in our degrading environment. They should be prepared to talk to any group who is prepared to listen to their message. Such groups should include primary, secondary and tertiary institutions, community groups (e.g., Lions, Rotary, etc.), conservation groups, and the various levels of the media. They should bear in mind that business groups and politicians are extremely important targets for the conservation ethic, as members of these groups are the most influential in decisions about land use and financial backing, or otherwise, for restoration.

Little is known about restoring landscapes, however, restoration must start now. Ecologists and other conservation biologists need to draw on their research to provide guidelines for the community to carry out the work, and the following should form a basis for such guidelines.

1. Retain all remaining native vegetation; fencing these areas to prevent domestic livestock grazing on them is an important step in the retention process.
2. Establish the objective for which particular areas are to be revegetated (e.g., reduce erosion, control water table, provide aesthetic values, expand the area available for nature conservation). The objectives will dictate the functions that the vegetation must serve, and if nature conservation is the prime objective, the vegetation may also improve degraded areas, provide additional patches for mobile species, establish linkages between isolated remnants and widen existing linkages.
3. Attempt to establish all levels of the original vegetation from herb layers through to woodland and forest, to provide the maximum range of habitats for fauna.
4. In heavily disturbed areas, use native species that have invaded gravel pits, sand pits, or road verges as these species have demonstrated their ability to establish in disturbed areas.
5. In order to set priorities for restoration, it will be necessary to carry out an inventory of the biota present in the landscape to be restored and the natural stocks present in surrounding areas. Particular attention should be paid to species required for the restoration work and ecological studies of those species undertaken. Experiments on germination and establishment of these species may be required.
6. Maintain records of data collected during ecological and re-establishment studies, taking note of the origin of the species used. There are many data available on aspects of landscape ecology in Australia, but these data need to be integrated into models of landscape function to make them useful to others.
7. Record the appearance of any species establishing itself in the restored areas.
8. Prepare results in a form that is readily accessible and assessable by all interested parties.
9. Be prepared to spend a significant amount of time (say 10%) publicizing the need for restoration work and the methods available. This is the ecological tithing espoused by Ehrlich and Ehrlich (1990).

All of the points listed above should involve local communities. Failure to involve the public-at-large in conservation and restoration will mean that the work will never take place, we will never achieve the three objectives of the World Conservation Strategy and we will continue to mine our agricultural land and lose our natural heritage.

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